Emerging Adults with Type 1 Diabetes during the First Year Post-High School: Perceptions of Parental Behaviors

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Abstract

Among 182 emerging adults with type 1 diabetes (93% White and 57% female), changes during the year post-high school were examined in perceptions of diabetes-specific conflict with parents, parent-youth shared responsibility, parental tangible aid, and parental autonomy support, as well as the moderating effects of living situation, gender, years with diabetes, and glycemic control. A linear mixed effects model, controlling for baseline values, tested the changes in and relationships among these variables over time. Changes over time in parent-youth conflict were moderated by living independently of parents; autonomy support and shared responsibility were moderated by years with diabetes; and tangible aid was moderated by glycemic control. Future longitudinal research needs to examine whether changes in parental behaviors lead to positive or negative diabetes outcomes among these emerging adults with diabetes.

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Emerging Adults with Type 1 Diabetes during the First Year Post-High School: Perceptions of Parental Behaviors

Emerging adulthood is a challenging time for youth with type 1 diabetes (Peters & Laffel, 2011). This period, from around 18 years of age to the mid-twenties, is a transitional time between childhood dependence and adult independence (Côté & Bynner, 2008). Although there is debate about the universality of this time period as a developmental stage (Côté & Bynner, 2008), youth in this prolonged period between childhood and adulthood are characterized as having the freedom to focus upon themselves and to explore their identity and future possibilities. In addition, emerging adulthood is a time of many changes (Arnett, 2007), with the first year after high school (HS) graduation long known for significant change (Aseltine & Gore, 1993). Parents are important to youth's adaptation and development in general (Beveridge & Berg, 2007), especially in relation to individuation and autonomy during adolescence (Steinberg, 2001) and emerging adulthood (Koepke & Denissen, 2012). This importance holds for both emerging adults in the general population (Dumas, Lawford, Tieu, & Pratt, 2009; Luyckx et al., 2011; Nelson, Padilla-Walker, Christensen, Evans, & Carroll, 2011; Urry, Nelson, & Padilla-Walker, 2011) and for children and adolescents with diabetes (Wysocki, Buckloh, Lochrie, & Antal, 2005). Relationships with parents likely change for emerging adults with diabetes after HS graduation because these youth, in contrast to children and adolescents, are expected to be much more autonomous in their diabetes care (Wolpert, Anderson, & Weissberg-Benchell, 2009).

This study is guided by a framework specific to emerging adults with diabetes (Hanna, 2012) as well as by classic writings, in general, on parental behaviors (Baumrind, 2005; Steinberg, 2001) and life course (Cowan, 1991; Elder, 1991; Zarit & Eggebeen, 2002). Hanna

(2012) proposed two key aspects of relationships that emerging adults with diabetes have relative to their parents: 1) quality of the parent-youth relationship, encompassing the emotional environment with positive and negative aspects (Manders, Scholte, Janssens, & De Bruyn, 2006) known to be important to late adolescents or early emerging adults (Hair, Moore, Garrett, Ling, & Cleveland, 2008); and 2) parental involvement in or support for diabetes care, with goals of developing youth autonomy for diabetes care and managing the diabetes well. This diabetes-specific parental involvement is within the broad definition of parental behaviors as goal-directed actions (Steinberg, 2001), specifically, to facilitate youth's autonomy and individuation and also their socially and developmentally appropriate behavior (Baumrind, 2005). In the case of diabetes, these two categories would be specific to goals of autonomy in diabetes care and good diabetes management behavior, respectively. Hanna (2012) also proposed that changes occur in these parental constructs over the course of this transitional period and in association with transitional events. This is consistent with life course writings proposing that changes occur in individuals and families over the life course (Elder, 1991), influencing perceptions of one another in the family (Cowan, 1991). These changes can be seen to occur within a broader historical and social context (Elder, 1991), and the timing of transitional events leads to variability in these changes (Zarit & Eggebeen, 2002).

An important quality of the parent-youth relationship in the diabetes context is parent-youth conflict, that is, confrontation around diabetes management (Dashiff, Hardeman, & McLain, 2008). Such conflict has been found to negatively influence diabetes outcomes in cross-sectional studies of diabetic samples with broad age ranges, representing children to late adolescents (Hilliard, Guilfoyle, Dolan, & Hood, 2011; Hood, Butler, Anderson, & Laffel, 2007; Weissberg-Benchell et al., 2009). However, such conflict has not been longitudinally examined

during the critical early years of emerging adulthood. Consistent with the reported decrease in parent-youth conflict in late adolescence (Kim, Conger, Lorenz, & Elder, 2001) and emerging adulthood (Aseltine & Gore, 2000) for the general population, it would be expected that parent-youth conflict in the context of diabetes might decrease during the year after HS graduation.

Diabetes-specific parental autonomy support is defined as parental involvement that facilitates diabetes-specific autonomy. This type of support, that is, parental encouragement, provision of choices, and use of reasoning (Lekes, Gingras, Philippe, Koestner, & Fang, 2010), faciliates volitional autonomy or self-goverance (Soenens et al., 2007). Although research is limited on parental autonomy support related to diabetes care, experts view it as important for adolescent development (Beveridge & Berg, 2007), and it is described by adolescents with diabetes as helpful for self-care (Hanna & Guthrie, 2001). It is likely that parental autonomy support decreases over time, since this parental behavior would become less salient for emerging adults with diabetes who, as HS seniors, already report relatively high autonomy in diabetes care (Hanna, Weaver, Stump, Dimeglio et al., 2013).

Parental behaviors that facilitate diabetes management include parent-youth shared responsibility and social support in the form of tangible aid from parents. Parent-youth shared diabetes care responsibility has been long conceptualized as both parents and youth having a role in the diabetes care (Anderson, Auslander, Jung, Miller, & Santiago, 1990), and has long been advocated by experts to facilitate good diabetes management in their children and adolescents (Anderson, Ho, Brackett, Finkelstein, & Laffel, 1997; Helgeson, Reynolds, Siminerio, Escobar, & Becker, 2008). However, emerging adults are expected to assume primary responsibility (Wolpert et al., 2009), and several studies have reported a shift of responsibility from parents to youth during late adolescence (Ingerski, Anderson, Dolan, & Hood, 2010; Schilling, Knafl, &

Grey, 2006). Therefore, it would be expected that shared diabetes care responsibility will decrease during the year following HS graduation.

Among emerging adults, parental support is important to mastery (Spencer & Patrick, 2009), and support as tangible aid, long known as physical or financial assistance (Barrera & Ainlay, 1983), is important to management of medical conditions (DiMatteo, 2004). Among those with diabetes, such assistance may be especially important, because parents may now give aid to autonomous individuals rather than "take on" diabetes care for dependent children and adolescents. In studies of children and adolescents encompassing a wide age range with diabetes, such support, measured alone or as part of a multidimensional construct, has been positively associated with better diabetes outcomes (Carcone, Ellis, Weisz, & Naar-King, 2011; Malik & Koot, 2011; Palmer et al., 2011; Pereira, Berg-Cross, Almeida, & Machado, 2008). Tangible aid would likely continue at a steady level during the year following HS graduation; emerging adults, although highly autonomous in diabetes care responsibility (Hanna, Weaver, Stump, Dimeglio et al., 2013), continue to rely on parents (Arnett, 2007), who most likely also have diabetes management as a goal.

Diabetes-specific parental behaviors, proposed to be associated with social contextual factors (Elder, 1991), may be particularily influenced by these youths' living situation. A major transitional event after HS is moving out of parental homes (Furstenberg, Rumbaut, & Settersten, 2005). There is variability in this event, with 90% of emerging adults known to change, within a four-month period of time, their living situation in relation to their parents (De Marco & Berzin, 2008). Support exists for the influence of living situation on emerging adults' relationships with their parents (Seiffge-Krenke, 2009). It is possible that emerging adults with diabetes who live independently of parents may continue to experience conflict with parents, since they are still in

contact via texting and cell phone calls. On the other hand, there may be less such conflict because emerging adults would be physically distant from and probably have fewer interactions with, parents around daily diabetes tasks. Furthermore, some youth may experience more autonomy supportive behavior because their parents are relatively more concerned that they become self-governing in diabetes care. This may not be the case for shared responsibility and tangible aid in association with living independently since parents of contemporary youth are able to maintain contact through texting, e-mailing, and cell phones. These parents could still be involved with their sons and daughters in sharing responsibility and providing tangible aid for diabetes tasks such as keeping track of supplies, making appointments, and discussing diabetes concerns with health care providers and other adults.

Gender may also be important, because differences in socialization between males and females is well recognized (Leaper & Freidman, 2007). Among the general population of youth, gender differences have been documented for some parental behaviors (Allison & Schultz, 2004; Chung, Flook, & Fuligni, 2009; Renk, Liljequist, Simpson, & Phares, 2005), especially in the degree of family contact during emerging adulthood, decreasing more quickly for males than females (Sneed et al., 2006). Among adolescents with diabetes, gender differences have been reported for parent-youth conflict (Pereira et al., 2008) and parent-youth sharing of responsibility (Pacaud et al., 2007). However, gender differences were not reported for parent-youth conflict in one study (Weissberg-Benchell et al., 2009).

Diabetes related historical contextual factors such as glycemic control and length of time since diabetes diagnosis are also likely to influence parental behaviors during emerging adulthood. During the early years of emerging adulthood, glycemic control is reported to worsen (Insabella, Grey, Knafl, & Tamborlane, 2007), and parental behaviors may have a different

pattern over time depending on emerging adults' level of glycemic control as they begin this transition. In addition, those who have had their diabetes for a shorter period of time (and thus have had less time to become self-sufficient in diabetes care) may experience higher levels of parental involvement. It is also likely that, among emerging adults who have had diabetes longer, parents may have established a certain way of being involved in care.

Although these parental behaviors have been associated with diabetes outcomes among adolescents, changes in the behaviors have not been examined during the early years of emerging adulthood, when significant developmental and transitional events are occurring, nor in association with salient contextual factors such as gender, glycemic control, and years with a diabetes diagnosis. Given that most diabetes clinicians will be working with emerging adults, they may benefit from a greater understanding of changes in these parental variables from emerging adults' perspectives, which can differ from parents' perspectives (Kenyon, 2009). Thus, as part of a longitudinal study on the transition to young adulthood among early emerging adults with type 1 diabetes described elsewhere (Hanna, Weaver, Stump, Dimeglio et al., 2013; Hanna, Weaver, Stump, Fortenberry, & DiMeglio, 2013; Hanna Scott & Schmidt, In press; Stupiansky, Hanna, Slaven, Weaver, & Fortenberry, 2013) this paper reports on changes in parental behaviors, as perceived by emerging adults, during the first year after HS graduation, as well as the moderation effects of living situation, gender, years with diabetes diagnosis, and glycemic control. Among early emerging adults with type 1 diabetes who have graduated from HS, we hypothesize that, during the year following HS graduation:

1. perceived diabetes-specific parent-youth conflict will decrease;
2. perceived parental autonomy support for diabetes care will decrease;
3. perceived parent-youth shared diabetes care responsibility will decrease;

4. perceived tangible aid for diabetes care from parents will not change; and
5. the respective relationships between time and perceived diabetes-specific parent-youth conflict, tangible aid from parents, parent-youth shared responsibility, and parental autonomy support will be moderated by living situation (independent of parents or not), gender, years with diabetes diagnosis, and glycemic control.

Methods

Sample

In the parent study, enrollment was face-to-face during a clinic visit or via telephone after potential participants and their families received a brief study summary from their health care providers (a regional university medical center, a private hospital, and a regional center providing outpatient diabetes care). The recruitment rate from the potential pool was 83%, with stated reasons for declining related to lack of interest, too busy, or not wanting to release private health information. Interested youth were screened for the following eligibility criteria: 17-19 years of age, in the last six months of HS, able to speak and read English, and living with parent(s) or guardian. To be able to identify the effects of transitional events, participants were enrolled prior to graduating from HS and moving out of parental homes. To control for factors that may interfere with becoming independent, participants were excluded if their diagnosis of diabetes was within the last year or if they had a serious psychiatric disorder or a second chronic illness. IRB approval was obtained for the study, with youth 18 years of age or older providing their own consent and youth under 18 years of age providing assents along with their parents consenting. The baseline participation rate was 91%, with 16 not completing baseline data collection after consent, two requesting to be withdrawn, and staff not able to contact two after consent. Participants and non-participants did not differ in age nor race; however, more females

than males participated (p <.05). For the follow-up period in the parent study, only 3% were considered lost to follow-up (three participants requested to be dropped, two died, and two could not be contacted after the six- or nine-month data collection points). An average of 82% of participants completed the six follow-up data collection points in the parent study; however, because participants missed some data points and yet completed later ones, participants missing a data point were not considered dropped from the study.

The sample for this report was 182 youth with type 1 diabetes who graduated from HS. On average, these participants were 18.2 years of age (*SD* = 0.4; range = 17.3-19.6), had been diagnosed with diabetes for 8.6 years (*SD* = 4.0; range = 1.1-18.1), and had an adjusted HbA1c value of 8.9% (*SD* = 1.7; range of 6.2-14.2%). About half reported use of injection for insulin administration while the remaining reporting use of continuous insulin infusion. Almost all were White (93%), and a little more than half were female (57%). Just under two thirds came from homes in which the parents were married (64%), most lived with both mother and father in the same household (62%), and only 4% of both mothers and fathers had less than a HS education.

Data Collection

Participants completed questionnaires on parental variables at baseline (within the last three months of HS graduation) and every three months for 1 year following graduation via a Web-based system or paper and pencil if that was their choice. At baseline, duration of diabetes and a glycemic control (HbA1c) values were obtained from current health care providers.

Diabetes-related, Socio-demographic and Situation Information. At baseline, participants reported on gender and race and, every three months post-baseline, on living situation. Responses about living situations were categorized as either living independent of parents or not. Adjusted HbA1c values were calculated to account for different assay methods

used by health care providers. From the reported HbA1c value, the assay-specific bias value, as determined by College of American Pathologists' (2012) survey data, was subtracted.

Parent-youth Diabetes-specific Conflict was measured by the 15-item Parent-Adolescent Diabetes Conflict Subscale of the Diabetes Responsibility and Conflict Scale (Peyrot, Steinberg, Rubin, & Young-Hyman, 2002). The perceived frequency with which youth had argued with their parents about insulin administration, glucose monitoring, meals, exercise, and discussion of diabetes with others over the last three months were assessed from *never* (1) to *all the time* (5). Participants' responses were summed, providing a total score with a potential range from 15-75 (higher scores indicating more conflict). The Cronbach's alpha coefficients ranged from .92 to .94 for the data collection points in the parent study sample.

Parental Autonomy Support for Diabetes Care was measured by the Parental Support for Adolescents' Autonomy Development scale (Hanna, Dimeglio, & Fortenberry, 2005). This 4-item scale assesses parental behaviors that are supportive of autonomy relative to insulin use. In relation to the past three months, participants were asked to note frequency from *none of the time* (0) to *all of the time* (4) and then to note degree of helpfulness of behaviors from *not at all helpful* (0) to *very helpful* (4). Scores were calculated by multiplying the frequency rating by the helpfulness rating and summing. The potential range of scores was 0 to 64 (higher scores indicating greater autonomy support). The Cronbach's alpha coefficient values across the data collection times ranged from .76 to .89 in the parent study sample.

Parent-Youth Shared Diabetes Care Responsibility was measured by the Independent Functioning and Decision-making in Daily and Non-Daily Diabetes Management Checklist developed for adolescents (Hanna & Guthrie, 2003). For this study, the original checklist was revised, deleting diabetes tasks for which this older age group would be highly independent such

as *checking and recording glucose test results.* Participants responded about who had had responsibility (parent alone, youth alone or both youth and parent) over the past three months for 15 diabetes tasks that were either daily (calculating insulin, decisions about food, and decisions about exercising) or non-daily (keeping track of supplies, making appointments, decisions about talking to health care provider, decisions about talking to teachers and employers about diabetes condition, and paying for prescriptions and medical appointments). The score for percent of shared responsibility was calculated by counting the number of responses indicating that both youth and parent shared responsibility and then dividing by the total number of items. Because the scoring of this measure indicates the proportion of number of salient diabetes tasks for which parents and youth shared responsibility rather than a total score reflecting an underlying construct, internal consistency was not assessed.

Tangible Aid for Diabetes Care from Parents was measured by the 15-item Support Checklist (Hanna, Juarez, Lenss, & Guthrie, 2003) assessing physical and financial assistance for diabetes care in the past three months. Diabetes tasks were assessed that occurred on a daily basis (such as remembering to check glucose and calculating insulin dose, whether injection or bolus) or on a non-daily basis (such as keeping track of supplies/insulin and making health care appointments). For this study, diabetes tasks that this age group would be highly independent in performing were deleted and the *yes-no* response format was changed to a rating of *no help* (0), *a little help* (1), or *a lot of help* (3). A total score was calculated by summing responses, with a potential 0-45 range of scores (higher scores indicating more tangible aid). The Cronbach's alpha coefficient values ranged from .86 to .91for the data collection points in the parent study sample.

Results

Description of Parental Variables

Table 1 shows, by time point, the means and standard deviations for the youth's perceptions of parental variables, as well as the percentages of participants living independently. These emerging adults had relatively low average scores at baseline for conflict with parents (M = 23.98; SD = 10.34), compared to the average (M = 36.83; SD = 19.49) in the sample of children and adolescents described by the scale developers (Peyrot et al., 2002). They also had lower scores for parental autonomy support (M = 10.04; SD = 13.24) than those (M = 27.9; SD = 19.3) in the sample of adolescents reported by the scale developers (Hanna et al., 2005). Because shared responsibility and tangible aid were assessed with revised measures for this sample of emerging adults, direct comparisons are not possible. At baseline, the typical emerging adult had low levels of shared responsibility, indicated by the average score of 26.51% (SD = 13.35), which is considerably lower than the potential high score of 100% shared responsibility. They also had moderate levels of diabetes-related tangible aid, with an average score (M = 27.38; SD = 8.97) above the midpoint of 22.5 on the range of potential scale scores from 0-45. Participants changed from all being at home at baseline to about 20% living independently at three months and then to about 60% living independently in later periods.

Table 2 shows the correlations among the baseline variables of interest in the models. Being female was significantly correlated with years of diabetes ($r_{\text{Point-Biserial}}$=.21) and parent-youth shared diabetes care responsibility ($r_{\text{Point-Biserial}}$=.16). Higher levels of HbA1c, reflecting poorer diabetes control, were correlated with more parent-youth conflict (r =.26). Higher levels of parental autonomy support were correlated with more parent-youth conflict (r =.18) and tangible aid (r =.49). Finally, having higher levels of parent-youth conflict was correlated with lower levels of parent-youth shared responsibility (r =-.18) and higher levels of tangible aid (r =.16).

Parental Variables over Time and in Association with Living Situation, Gender, Duration of Diabetes Diagnosis, and Glycemic Control

Parental outcomes as reported by the youth were modeled over time using a general linear mixed effects model (GLMN). GLMM uses all available data; that is, a participant is not dropped from the analysis when some of the data are missing, as in traditional repeated measures ANOVA. In addition, this modeling strategy allows for time-varying covariates, flexible covariance structures, and specification of subject-specific effects (McCulloch & Searle, 2001). Separate models were tested for each of four outcomes: (1) diabetes-specific parent-youth conflict, (2) diabetes-specific parental support for autonomy, (3) parent-youth shared diabetes care responsibility, and (4) diabetes-related tangible aid from parents. An unstructured covariance structure was used to model the variance and covariance among four repeated measures (three, six, nine, and twelve months from graduation) within each subject. Independent variables included time, independent living status relative to parents (time-varying), gender, years with diabetes diagnosis, glycemic control, and the baseline value of the modeled outcome. For each outcome, a full model with main and interaction effects was specified first, including intercept, time, gender, living independently, HbA1c, years with diabetes, baseline version of outcome, and interaction terms for time by living independently, time by years with diabetes, and time by HbA1c. Non-significant interaction effects were subsequently eliminated from the model. All models were estimated using the PROC MIXED procedure available in SAS/STAT software using a .05 level of significance. Conformance to statistical assumptions was evaluated for each model, and Box-Cox transforms applied as appropriate. A log transform was applied to the parent-youth conflict variable, and a square root transform was applied to the parental autonomy support variable.

Table 3 shows the *F* statistics and values for main and interaction effects within the parental outcome repeated-measures models. After controlling for baseline values, there was a statistically significant main effect for independent living on shared responsibility (p=.006), with those living independently having lower values (*LSM* = 26.71, *SE* = 1.19) than those who did not (*LSM* = 30.64, *SE* = 1.19). Interaction terms involving time were significant in each of the four models, making it difficult to directly interpret the main effect of time; that is, the main effect of time depended on level of the interacting factor in the model. Time by duration of diabetes was significant for parental autonomy support (p <.026) and shared responsibility (p <.015). Time by independent living was significant for parent-youth conflict (p =.029), whereas time by HbA1c was significant for tangible aid (p =.013). Table 4 demonstrates moderation of relationships over time identified by the statistically significant interactions, as it is that variability in size and direction of the slopes for the various time points that is tested by the interaction effect. For relationships between duration of diabetes and parental autonomy support; duration of diabetes and shared responsibility; and glycemic control and tangible aid, three-month values showed positive slopes over time while these relationships at six, nine, and twelve months showed negative or relatively flat slopes. Table 5 demonstrates the interaction of parent-youth conflict with living independently of parents over time. At nine months, conflict was lower for those living independently whereas at three and twelve months, those who lived independently had more conflict than those who did not live independently of parents.

Discussion

The findings of this study extend knowledge about parental behaviors as perceived by youth with diabetes to the year following HS graduation. For the most part, these emerging adults, as HS seniors, perceived relatively low levels of conflict with their parents, shared

responsibility with their parents for diabetes care, and parental autonomy support. The relatively low levels of all three of these parental behaviors are consistent with the fact that emerging adults have great independence (Arnett, 2007), especially in terms of decreasing family contact (Sneed et al., 2006). However, there was a moderate level of tangible aid from parents in this study. Given that tangible aid items included keeping track of supplies, making appointments, and paying for prescriptions, supplies, and health care visits, this is consistent with the writings on emerging adults, who continue to rely on parents (Arnett, 2007), especially in the context of contemporary socioeconomic conditions (Côté & Bynner, 2008).

The findings of this study provide support for the premise that social contextual factors are associated with parental behaviors (Elder, 1991). Consistent with the reported association of living situation with parent-youth interactions among the general population of emerging adults (Seiffge-Krenke, 2009), living independently of parents in this study was associated with less parent-youth shared responsibility.

These emerging adults with diabetes perceived changes in parental behaviors in relation to living situation, duration of diabetes, and glycemic control during this year following HS graduation. Diabetes-specific parent-youth conflict was higher in those living independently of parents at 3 months after HS graduation, whereas at six months mean values were similar between those groups. However, those living independently at nine months tended to have relatively less conflict, whereas at 12 months they tended to have more conflict. These findings indicate a volatile pattern of conflict and were contrary to our hypothesis that conflict would decrease during this time period. The findings are also inconsistent with the general decrease in such conflict among late adolescents (Kim et al., 2001) and emerging adults (Aseltine & Gore, 2000). It is possible that parent-youth conflict specific to diabetes is a reflection of the turmoil of

the year following HS graduation, long known as a critical transitional event (Aseltine & Gore, 1993) with such life events assumed to require adaptation (Holmes & Rahe, 1967).

The relationship between autonomy support and time was moderated by the length of time since the diabetes diagnosis. Our hypothesis that parental autonomy support would decrease was only partially supported and was moderated by years with diabetes; at six, nine, and twelve months, the less time with diabetes, the less autonomy support. This suggests that such support may no longer be salient because even HS seniors are known to be highly autonomous in diabetes care (Hanna, Weaver, Stump, Dimeglio et al., 2013). Interestingly, however, at three months, the more time emerging adults had been diagnosed with diabetes, the more parental autonomy support that they perceived. Perhaps the first three months after HS graduation is a critical period for parents, who are focused on facilitating greater autonomy in diabetes care, a parental goal articulated by Hanna (2012). In addition, parents who have been involved in diabetes care longer would have more experience in and be more established in providing autonomy support, suggesting the influence of historical contextual factors, as proposed by Elder (1991).

Our hypothesis that parent-youth shared diabetes care responsibility would decrease during the year following HS graduation was partially supported; the relationship between time and shared responsibility depended upon the length of time with diabetes. The greater the length of time with diabetes, the more parent-youth shared responsibility for diabetes care at 3 months, whereas for months nine and twelve, the less time since the diabetes diagnosis, the less shared responsibility. Again, it could be that the first three months after HS graduation is a critical period for parents, who are assumed to be concerned about maintaining good diabetes management, a parental goal (Hanna, 2012). In addition, parents who have been involved in

diabetes care longer are more experienced and established in sharing diabetes care responsibility with their son or daughter. This is consistent with the premise of life course writings that historical contextual factors are influential for parents and youth during transitions (Elder, 1991).

Our hypothesis that tangible aid from parents would not change during the year following HS graduation was not supported. However, the perceived changes in tangible aid from parents over time depended on glycemic control. The poorer the glycemic control (higher HbA1c values) in HS, the more tangible aid there was from parents at three months. Again, it is possible that the first three months after HS graduation are seen as critical by parents, who provide greater levels of tangible aid when glycemic control is poorer. This finding suggests support for Hanna's (2012) premise that good diabetes management is a parental goal. However, the better the glycemic control (lower HbA1c values) in HS, the greater the tangible aid at six, nine, and twelve months. For these time points, it is quite possible that emerging adults with diabetes who have better glycemic control at six, nine, and twelve months are more accepting of such aid from their parents. These findings suggest support for Elder's (1991) premise that historical contextual factors, in this case poor glycemic control, influence changes during transitions.

Gender was not significantly associated with any of these emerging adults' perceived parental behaviors. This is in contrast to evidence documenting gender differences in terms of parent-youth conflict among youth in general (Allison & Schultz, 2004; Chung et al., 2009; Renk et al., 2005) and those with diabetes (Pereira et al., 2008) as well as parent-youth sharing of responsibility (Pacaud et al., 2007). However, the lack of gender differences is consistent with other findings of no association between parent-youth conflict and gender among adolescents with diabetes (Weissberg-Benchell et al., 2009). It is possible that how males and females interact with their parents is well established prior to emerging adulthood, and thus controlling

for baseline values for these parental behaviors did not allow for significant associations between gender and parental behaviors at the various time points. However, parental behaviors and gender associations have been noted in the pairing of same and different gender among sons and daughters and their mothers and fathers (McKinney & Renk, 2008).

There are some limitations of this study that need to be considered. The findings can only be generalized to similar populations, that is, parents who have at least a HS education and are married, since social and economic disadvantage pose additional stressors and have implications for social adjustment in emerging adulthood (Ehrlich, Dykas, & Cassidy, 2012; Gore, Aseltine, & Schilling, 2007), and married parents have more positive attitudes about providing financial assistance during this transition (Aquilino, 2005). In addition, this study did not examine individual and family characteristics known to be associated with parental behaviors (Collins, Maccoby, Steinberg, Hetherington, & Bornstein, 2003). Finally, only the perceptions of the emerging adults were collected. Parents do have different perceptions than emerging adults, (Nelson et al., 2007) and interactions between parents and youth are influential to one another's perceptions and actions (Beveridge & Berg, 2007; Koepke & Denissen, 2012). Observational measures of these interactions would provide greater insight into parent-youth interactions than self-report with its inherent bias.

The findings of this study have implications for clinical practice and further research. Health care professionals need to be aware that the year after HS graduation appears to be a time for volatility in parent-youth conflict while the first three months after appear to be a time when parents attempt to prepare their sons and daughters for the transition. Further, these professionals need to understand that change in parental behaviors are association with the glycemic control, years with diabetes and living situation in relation to parents. However, more research is needed

to guide clinicians in providing care for these youth. Longitudinally designed studies are needed to examine whether changes in parental behaviors lead to positive or negative diabetes outcomes among these emerging adults with diabetes. In addition, future studies need to address how individual characteristics moderate parental behaviors. For example, parental behaviors with their sons or daughters may vary according to their child's degree of impulse control, known to be immature for adolescents and emerging adults (Steinberg, 2008) and to be associated with diabetes management (Stupiansky et al, 2013). In addition, examination of changes in parental behaviors among emerging adults with type 1 diabetes from a broad range of socio-economic statuses could add insight. Finally, studies that examine both emerging adults' and their parents' perspectives could add insight into parent-youth interactions around diabetes care.

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Table 1. Descriptive Statistics for Parental and Situational Variables by Time Point.

	Baseline (N =182)	3 months (N=171)	6 months (N=154)	9 months (N=151)	12 months (N=139)
Parental Variables	**M (SD)**	**M (SD)**	**M (SD)**	**M (SD)**	**M (SD)**
Parent-youth Conflict	23.98 (10.34)	22.97 (9.59)	22.27 (9.64)	21.51 (7.71)	21.33 (8.83)
Parental Autonomy Support	10.04 (13.24)	8.87 (11.82)	8.51 (13.22)	6.88 (10.03)	6.53 (11.11)
Parent-youth Shared Responsibility	26.51 (13.35)	27.93 (15.74)	29.13 (17.44)	28.52 (18.63)	29.26 (16.11)
Tangible Aid from Parents	27.38 (8.97)	24.54 (9.22)	21.86 (9.79)	20.71 (10.24)	20.69 (8.83)
Situational Variable	**%**	**%**	**%**	**%**	**%**
Living Independently	0	21.35	59.09	62.91	59.42

Table 2. Correlations for Baseline Variables.

Variable	1	2	3	4	5	6	7
1. Female Gender[1]	1.00	0.14	0.21**	0.09	0.02	0.16*	0.03
2. HbA1c		1.00	-0.003	0.06	0.26***	-0.11	0.03
3. Years with Diabetes			1.00	-0.03	0.08	-0.12	-0.12
4. Parental Autonomy Support				1.00	0.18*	0.08	0.49****
5. Parent-youth Conflict					1.00	-0.18*	0.16*
6. Parent-youth Shared Responsibility						1.00	0.12
7. Parental Tangible Aid							1.00

Note. * = p<.05; ** = p<.01; *** = p<.001; **** = p<.0001; [1] = correlations with female gender are Point-Biserial, with females coded as 1.

Table 3. F Statistics and Associated p-values for Type III Fixed Effects Obtained from Repeated Measures Regression Models.*

Variable	**Parent-Youth Conflict**		**Parental Autonomy Support**		**Parent-Youth Shared Responsibility**		**Tangible Aid from Parents**	
	F (df1, df2)	p-value	F (df1, df2)	p-value	F (df1, df2)	p-value	F (df1, df2)	p-value
Model 1: Living Situation								
Time	1.96 (3, 171)	.121	0.83 (3, 171)	.477	4.94 (3, 171)	.003	3.03 (3, 164)	.031
Female	1.60 (1, 171)	.207	1.32 (1, 171)	.253	1.31 (1, 171)	.253	0.02 (1, 164)	.881
Independent living	0.09 (1, 171)	.770	0.12 (1, 171)	.733	7.68 (1, 171)	.006	0.02 (1, 164)	.898
Hemoglobin A1c	1.74 (1,171)	.189	0.16 (1,171)	.692	0.07 (1,171)	.791	0.82 (1,164)	.365
Years with diabetes	2.10 (1,171)	.149	1.42 (1,171)	.236	0.10 (1,171)	.750	0.11 (1,164)	.745
Baseline version of outcome	99.03 (1,171)	<.001	258.15 (1,171)	<.001	62.38 (1, 171)	<.001	72.48 (1, 164)	<.001
Time*independent living	3.07 (3, 171)	.029	----	----	----	----	----	----
Time*years with diabetes	----	----	3.18 (3,171)	.026	3.59 (3,171)	.015	----	----
Time*Hemoglobin A1c					----	----	3.72 (3,164)	.013

Note. *Non-significant interaction terms were removed.

Table 4. Simple Main Effects Analysis: Slopes for Duration of Diabetes with Parental Autonomy and Shared Responsibility, and Slope for HbA1c with Tangible Aid, Controlling for Time.

Time	**3 Months**	**6 Months**	**9 Months**	**12 Months**
	Slope (SE)	**Slope (SE)**	**Slope (SE)**	**Slope (SE)**
Parental Autonomy & Duration of Diabetes	0.03 (0.03)	-0.02 (0.03)	-0.06 (0.03)	-0.03 (0.03)
Shared Responsibility & Duration of Diabetes	0.71 (0.27)	0.17 (0.33)	-0.39 (0.37)	-0.11 (0.35)
Tangible Aid & HbA1c	0.38 (0.42)	-0.80 (0.47)	-0.85 (0.50)	-0.04 (0.51)

Table 5. Least Squared Mean and Standard Error for Parent-Youth Conflict by Living Independently of Parents, Controlling for Time.

Time	**Living Independently**	**Not Living Independently**
3 Months	3.08 (0.04)	3.05 (0.02)
6 Months	3.04 (0.03)	3.04 (0.04)
9 Months	2.94 (0.02)	3.02 (0.03)
12 Months	3.03 (0.03)	2.95 (0.04)